APPENDIX A

SUMMARY OF EMISSION FACTORS

TABLE A-1. SUMMARY OF EMISSION FACTORS

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-01-197-45	Ethylene Manufacturing - Compressor Lube Oil Vent[a]	Compressor Lube Oil Vents	Uncontrolled	0.0006 lb/ton (0.0003 kg/Mg)	U
		Single Compressor Train	Uncontrolled	0.0004 lb/ton (0.0002 kg/Mg)	U
		Dual Compressor Train	Uncontrolled	0.0008 lb/ton (0.0004 kg/Mg)	U
3-01-197-42	Ethylene Manufacturing Pyrolysis Furnace Decoking[a]	Pyrolysis Furnace Decoking		No benzene emissions	
3-01-197-43	Ethylene Manufacturing - Acid Gas Removal[a]	Acid Gas Removal		No benzene emissions	
3-01-197-44	Ethylene Manufacturing - Catalyst Regeneration[a]	Catalyst Regeneration		No benzene emissions	
3-01-820-09	Ethylene Manufacturing-Secondary Sources[a]	Secondary Wastewater Treatment	Uncontrolled	0.0434 lb/ton (0.0217 kg/Mg)	U
3-01-197-49	Ethylene Manufacturing - Equipment Leak Emissions[a]	Equipment Leak Emissions	Detection/Correction of leaks	See Section 4.5.2	
			Uncontrolled	See Section 4.5.2	
3-01-197-99	Ethylene Manufacturing - Intermittent Emissions[a]	Intermittent Emissions[b]			
		Single Compressor Train	Flare	0.1584-0.0316 lb/ton (0.0792-0.0158 kg/Mg)	U
			Uncontrolled	1.584 lb/ton (0.7919 kg/Mg)	U
		Dual Compressor Train	Flare	0.0202-0.004 lb/ton (0.0101-0.002 kg/Mg)	U
			Uncontrolled	0.2022 lb/ton (0.1011 kg/Mg)	U

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-03-003-15	By-Product Coke - Gas By-Product Plant (Furnace Coke)	Cooling Tower			
		-Direct Water	Uncontrolled	0.54 lb/ton (270 g/Mg)	E
		-Tar Bottom	Uncontrolled	0.14 lb/ton (70 g/Mg)	E
		Light-Oil Condenser Vent	Uncontrolled	0.18 lb/ton (89 g/Mg)	E
			Gas Blanketing	3.6×10^{-3} lb/ton (1.8 g/Mg)	E
		Naphthalene Separation and Processing	Uncontrolled	0.22 lb/ton (110 g/Mg)	E
			Activated Carbon	7.0×10^{-4}lb/ton (0.35g/Mg)	E
		Tar-Intercepting Sump	Uncontrolled	0.019 lb/ton (9.5 g/Mg)	E
		Tar Dewatering	Uncontrolled	0.042 lb/ton (21 g/Mg)	E
			Gas Blanketing	8.4×10^{-4} lb/ton (0.45 g/Mg)	E
		Tar Decanter	Uncontrolled	0.11 lb/ton (54 g/Mg)	E
			Gas Blanketing	22×10^{-3} lb/ton (1.1 g/Mg)	E
		Tar Storage	Uncontrolled	0.013 lb/ton (6.6 g/Mg)	E
			Gas Blanketing	7.6×10^{-4} lb/ton (0.38 g/Mg)	E
		Light-Oil Sump	Uncontrolled	0.03 lb/ton (15 g/Mg)	E
			Source Enclosure	6×10^{-4} lb/ton (0.3 g/Mg)	E
		Light-Oil Storage	Uncontrolled	0.012 lb/ton (5.8 g/Mg)	E
			Gas Blanketing	2.4×10^{-4} lb/ton (0.12 g/Mg)	E

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-03-003-15	By-Product Coke-Gas By-Product Plant (Furance Coke) (continued)	BTX Storage	Uncontrolled	0.012 lb/ton (5.8 g/Mg)	E
			Gas Blanketing	2.4×10^{-4} lb/ton (0.12 g/Mg)	E
		Benzene Storage	Uncontrolled	0.0116 lb/ton (5.8 g/Mg)	E
			Nitrogen or Natural Gas Blanketing	2.4×10^{-4} lb/ton (0.12 g/Mg)	E
		Flushing-Liquor Circulation Tank	Uncontrolled	0.026 lb/ton (13 g/Mg)	E
			Gas Blanketing	5.2×10^{-4} lb/ton (0.26 g/Mg)	E
		Excess-Ammonia Liquor Tank	Uncontrolled	0.018 lb/ton (9 g/Mg)	E
			Gas Blanketing	5.6×10^{-4} lb/ton (0.028 g/Mg)	E
		Wash-Oil Decanter	Uncontrolled	7.6×10^{-3} lb/ton (3.8 g/Mg)	E
			Gas Blanketing	1.5×10^{-4} lb/ton (0.076 g/Mg)	E
		Wash-Oil Circulation Tank	Uncontrolled	7.6×10^{-3} lb/ton (3.8 g/Mg)	E
			Gas Blanketing	1.5×10^{-4} lb/ton (0.076 g/Mg)	E
3-03-003-15	By-Product Coke-Gas By-Product Plant (Foundry Coke)	Cooling Tower			
		-Direct Water	Uncontrolled	0.40 lb/ton (200 g/Mg)	E
		-Tar Bottom	Uncontrolled	0.10 lb/ton (51 g/Mg)	E
		Light-Oil Condenser Vent	Uncontrolled	0.096 lb/ton (48 g/Mg)	E
			Gas Blanketing	1.9×10^{-3} lb/ton (0.97 g/Mg)	E

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-03-003-15	By-Product Coke-Gas By-Product Plant (Foundry Coke) (continued)	Naphthalene Separation and Processing	Uncontrolled	0.16 lb/ton (80 g/Mg)	E
			Activated Carbon	5.0×10^{-4}lb/ton (0.25 g/Mg)	E
		Tar-Intercepting Sump	Uncontrolled	0.009 lb/ton (4.5 g/Mg)	E
		Tar Dewatering	Uncontrolled	0.20 lb/ton (9.9 g/Mg)	E
			Gas Blanketing	4×10^{-4} lb/ton (0.2 g/Mg)	E
		Tar Decanter	Uncontrolled	0.05 lb/ton (25 g/Mg)	E
			Gas Blanketing	1.0×10^{-3} lb/ton (0.5 g/Mg)	E
		Tar Storage	Uncontrolled	6.2×10^{-3} lb/ton (3.1 g/Mg)	E
			Gas Blanketing	3.6×10^{-4} lb/ton (0.18 g/Mg)	E
		Light-Oil Sump	Uncontrolled	0.016 lb/ton (8.1 g/Mg)	E
			Gas Blanketing	3.2×10^{-4} lb/ton (0.16 g/Mg)	E
		Light-Oil Storage	Uncontrolled	6.2×10^{-3} lb/ton (3.1 g/Mg)	E
			Gas Blanketing	1.2×10^{-4} lb/ton (0.06 g/Mg)	E
		BTX Storage	Uncontrolled	6.2×10^{-3} lb/ton (3.1 g/Mg)	E
			Gas Blanketing	1.2×10^{-4} lb/ton (0.06 g/Mg)	E
		Benzene Storage	Uncontrolled	6.2×10^{-3} lb/ton (3.1 g/Mg)	E
			Nitrogen or Natural Gas Blanketing	1.2×10^{-4} lb/to (0.06 g/Mg)	E
		Flushing-Liquor Circulation Tank	Uncontrolled	0.019 lb/ton (9.5 g/Mg)	E
			Gas Blanketing	3.8×10^{-4} lb/ton (0.19 g/Mg)	E

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-03-003-15	By-Product Coke - Gas By-Product Plant (Foundry Coke) (continued)	Excess-Ammonia Liquor Tank	Uncontrolled	2.0 x 10^{-3} lb/ton (1.0 g/Mg)	E
			Gas Blanketing	4.0 x 10^{-5} lb/ton (0.020 g/Mg)	E
		Wash-Oil Decanter	Uncontrolled	4.2 x 10^{-3} lb/ton (2.1 g/Mg)	E
			Gas Blanketing	8.2 x 10^{-5} lb/ton (0.041 g/Mg)	E
		Wash-Oil Circulation Tank	Uncontrolled	4.2 x 10^{-3} lb/ton (2.1 g/Mg)	E
			Gas Blanketing	8.2 x 10^{-5} lb/ton (0.041 g/Mg)	E
3-03-003-15	By-Product Coke - Furnace Coke By-Product Recovery (Light Oil BTX Recovery)	Valves	Uncontrolled	0.4 lb/day (0.18 kg/day)	U
			Quarterly Inspection	0.15 lb/day (0.07 kg/day)	U
			Monthly Inspection	0.11 lb/day (0.05 kg/day)	U
			Use Sealed Bellows Valves	--	
		Pumps	Uncontrolled	4.2 lb/day (1.9 kg/day)	U
			Quarterly Inspection	1.2 lb/day (0.55 kg/day)	U
			Monthly Inspection	0.71 lb/day (0.32 kg/day)	U
			Use of Dual Mechanical Seals	--	

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-03-003-15	By-Product Coke - Furnace Coke By-Product Recovery (Light Oil BTX Recovery) (continued)	Exhausters	Uncontrolled	0.62 lb/day (0.28 kg/day)	U
			Quarterly Inspection	0.29 lb/day (0.13 kg/day)	U
			Monthly Inspection	0.22 lb/day (0.10 kg/day)	U
			Use of Degassing Reservoir Vents	--	
		Pressure Relief Devices	Uncontrolled	6.0 lb/day (2.7 kg/day)	U
			Quarterly Inspection	3.3 lb/day (1.5 kg/day)	U
			Monthly Inspection	2.9 lb/day (1.3 kg/day)	U
			Use of Rupture Disk System	--	
		Sampling Connections	Uncontrolled	0.55 lb/day (0.25 kg/day)	U
			Closed-purge Sampling	--	
		Open-ended Lines	Uncontrolled	0.084 lb/day (0.038 kg/day)	U
			Plug or Cap	--	
3-03-003-15	By-Product Coke - Furnace Coke Gas By-Product Recovery (Light Oil Recovery, Benzene Refining)	Valves	Uncontrolled	0.49 lb/day (0.22 kg/day)	U
			Quarterly Inspection	0.18 lb/day (0.08 kg/day)	U
			Monthly Inspection	0.13 lb/day (0.06 kg/day)	U
			Use of Sealed Bellows Valves	--	

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-03-003-15	By-Product Coke - Furnace Coke By-Product Recovery (Light Oil Recovery, Benzene Refining) (continued)	Pumps	Uncontrolled	5.1 lb/day (2.3 kg/day)	U
			Quarterly Inspection	1.5 lb/day (0.67 kg/day)	U
			Monthly Inspection	0.86 lb/day (0.39 kg/day)	U
			Use of Dual Mechanical Seals	--	
		Exhausters	Uncontrolled	0.62 lb/day (0.28 kg/day)	U
			Quarterly Inspection	0.29 lb/day (0.13 kg/day)	U
			Monthly Inspection	0.22 lb/day (0.10 kg/day)	U
			Use of Degassing Reservoir Vents	--	
		Pressure Relief Devices	Uncontrolled	7.5 lb/day (3.4 kg/day)	U
			Quarterly Inspection	4.2 lb/day (1.9 kg/day)	U
			Monthly Inspection	3.5 lb/day (1.6 kg/day)	U
			Use of Rupture Disk System	--	
		Sampling Connections	Uncontrolled	0.68 lb/day (0.31 kg/day)	U
			Closed-purge Sampling	--	
		Open-ended Lines	Uncontrolled	0.104 lb/day (0.047 kg/day)	U
			Plug or Cap	--	

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-03-003-15	By-Product Coke - Foundry By-Product Recovery (Light Oil BTX Recovery)	Valves	Uncontrolled	0.35 lb/day (0.16 kg/day)	U
			Quarterly Inspection	0.13 lb/day (0.06 kg/day)	U
			Monthly Inspection	0.09 lb/day (0.04 kg/day)	U
			Use of Sealed Bellows Valves	--	
		Pumps	Uncontrolled	3.7 lb/day (1.7 kg/day)	U
			Quarterly Inspection	1.1 lb/day (0.5 kg/day)	U
			Monthly Inspection	0.66 lb/day (0.3 kg/day)	U
			Use of Dual Mechanical Seals	--	
		Exhausters	Uncontrolled	0.55 lb/day (0.25 kg/day)	U
			Quarterly Inspection	0.24 lb/day (0.11 kg/day)	U
			Monthly Inspection	0.20 lb/day (0.09 kg/day)	U
			Use of Degassing Reservoir Vents	--	
		Pressure Relief Devices	Uncontrolled	5.5 lb/day (2.5 kg/day)	U
			Quarterly Inspection	3.1 lb/day (1.4 kg/day)	U
			Monthly Inspection	2.6 lb/day (1.2 kg/day)	U
			Use of Rupture Disk System	--	
		Sampling Connections	Uncontrolled	0.51 lb/day (0.23 kg/day)	U
			Plug or Cap	--	

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-03-003-15	By-Product Coke - Foundry By-Product Recovery (Light Oil BTX Recovery) (continued)	Open-ended Lines	Uncontrolled	0.077 lb/day (0.035 kg/day)	U
			Closed-purge Sampling	--	
3-03-003-15	By-Product Coke - Foundry By-Product Recovery (Light Oil Recovery Benzene Refining)	Valves	Uncontrolled	0.44 lb/day (0.20 kg/day)	U
			Quarterly Inspection	0.15 lb/day (0.07 kg/day)	U
			Monthly Inspection	0.13 lb/day (0.06 kg/day)	U
		Valves	Use of Sealed Bellows Valves	--	
		Pumps	Uncontrolled	4.6 lb/day (2.1 kg/day)	U
			Quarterly Inspection	1.3 lb/day (0.6 kg/day)	U
			Monthly Inspection	0.88 lb/day (0.4 kg/day)	U
			Use of Dual Mechanical Seals	--	
		Exhausters	Uncontrolled	0.55 lb/day (0.25 kg/day)	U
			Quarterly Inspection	0.24 lb/day (0.11 kg/day)	U
			Monthly Inspection	0.20 lb/day (0.09 kg/day)	U
			Use of Degassing Reservoir Vents	--	

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-03-003-15	By-Product Coke - Foundry By-Product Recovery (Light Oil Recovery Benzene Refining) (continued)	Pressure Relief Devices	Uncontrolled	6.8 lb/day (3.1 kg/day)	U
			Quarterly Inspection	3.7 lb/day (1.7 kg/day)	U
			Monthly Inspection	3.3 lb/day (1.5 kg/day)	U
			Use of Rupture Disk System	--	
		Sampling Connections	Uncontrolled	0.62 lb/day (0.28 kg/day)	U
			Plug or Cap	--	
		Open-ended Lines	Uncontrolled	0.95 lb/day (0.043 kg/day)	U
			Close-purge Sampling	--	
3-01-169-02	Ethylbenzene Manufacturing - Alkylation Reactor Vent[c]	Alkylation Reactor Vent	Process Heater	0.0006 lb/ton (0.0003 kg/Mg)	U
			Uncontrolled	0.6 lb/ton (0.3 kg/Mg)	U
3-01-169-03	Ethylbenzene Manufacturing - Benzene Drying Column[c]	Atmospheric/Pressure Column Vents[d]	Flare	0.024 - 0.96 lb/ton (0.012 - 0.48 kg/Mg)	U
			Uncontrolled	2.4 lb/ton (1.2 kg/Mg)	U
3-01-169-06	Ethylbenzene Manufacturing - Polyethylbenzene Recovery Column[c]	Other Vacuum Vents[e]	Flare	0.0010 - 0.004 lb/ton (0.005 - 0.002 kg/Mg)	U
			Uncontrolled	0.10 lb/ton (0.05 kg/Mg)	U
3-01-206-02	Styrene Manufacturing - Styrene Purification Vents[c]	Benzene-Toluene Vacuum Vent	Flare	0.06 - 2.4 lb/ton (0.03 - 1.2 kg/Mg)	U
			Uncontrolled	6.0 lb/ton (3.0 kg/Mg)	U
3-01-206-03	Styrene Manufacturing - Hydrogen Separation Vent[c]	Hydrogen Separation Vent	Flare	0.00006 - 0.0024 lb/ton (0.00003 -0.0012 kg/Mg)	U
			Uncontrolled	0.006 lb/ton (0.003 kg/Mg)	U

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-01-169-80/ 3-01-206-80	Ethylbenzene/Styrene Manufacturing - Equipment Leaks[c]	Equipment Leaks	Detection and Correction	See Section 4.5.2	
			Uncontrolled		
4-07-196-02/ 4-07-196-13	Ethylbenzene/Styrene Manufacturing - Storage and Handling[c]	Storage and Handling	Floating Roof, Vented to Flare, Refrigerated Vent Condenser , and Uncontrolled	See Section 4.5.3	
3-01-156-02	Cumene Manufacturing - Benzene Drying Column	Process Vent	Flare	2.00×10^{-3} lb/ton (1.00×10^{-3} kg/Mg)	U
			Uncontrolled	4.00×10^{-2} lb/ton (2.00×10^{-2} kg/Mg)	U
3-01-156-03	Cumene Manufacturing - Catalyst Mix Tank Scrubber Vent	Process Vent	Flare	1.59×10^{-2} lb/ton (7.95×10^{-3} kg/Mg)	U
			Uncontrolled	3.18×10^{-1} lb/ton (1.59×10^{-1} kg/Mg)	U
3-01-156-04	Cumene Manufacturing - Wash-Decant System Vent	Process Vent	Flare	7.84×10^{-4} lb/ton (3.92×10^{-4} kg/Mg)	U
			Uncontrolled	1.57×10^{-2} lb/ton (7.85×10^{-3} kg/Mg)	U
3-01-156-05	Cumene Manufacturing - Benzene Recovery Column	Process Vent	Flare	1.70×10^{-3} lb/ton (8.50×10^{-4} kg/Mg)	U
			Uncontrolled	3.40×10^{-2} lb/ton (1.70×10^{-2} kg/Mg)	U
3-01-202-02	Phenol Manufacturing - Cumene Oxidation	Process Vent	Uncontrolled[f]	4.00×10^{-3} lb/ton (2.00×10^{-3} kg/Mg)	U
3-01-202-02	Phenol Manufacturing - Cumene Oxidation	Process Vent	Thermal Oxidizer	1.16×10^{-4} lb/ton (5.82×10^{-5} kg/Mg)	D

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-01-195-01	Nitrobenzene - General	Small Benzene Storage (Point G)	Uncontrolled	0.156 lb/ton (0.078 g/kg)	U
				0.154 lb/ton (0.077 g/kg)	U
		Benzene Storage (Point G)	Uncontrolled	0.566 lb/ton (0.283 g/kg)	U
				0.562 lb/ton (0.281 g/kg)	U
			Internal Floating Roof	0.085 lb/ton (0.0425 g/kg)	U
		Secondary (Point J)	Uncontrolled	0.20 lb/ton (0.10 g/kg)	U
		Total Plant	Uncontrolled	4.9 lb/ton (2.45 g/kg)	U
				4.4 lb/ton (2.19 g/kg)	U
			Vent Adsorber	0.78 lb/ton (0.39 g/kg)	U
				0.64 lb/ton (0.32 g/kg)	U
			Thermal Oxidizer	0.44 lb/ton (0.22 g/kg)	U
				0.52 lb/ton (0.26 g/kg)	U
3-01-195-03	Nitrobenzene - Acid Stripper Vent	Waste-Acid Stripper (Point B)	Uncontrolled	0.034 lb/ton (0.170 g/kg)	U
3-01-195-04	Nitrobenzene - Washer/Neutralizer Vent	Wash and Neutralization (Point C)	Uncontrolled	0.0162 lb/ton (0.0081 g/kg)	U
			Vent Adsorber	0.155 lb/ton (0.0776 g/kg)	U
3-01-195-05	Nitrobenzene - Nitrobenzene Stripper Vent	Nitrobenzene Stripper (Point D)	Uncontrolled	0.34 lb/ton (0.170 g/kg)	U
			Thermal Oxidizer	0.0288 lb/ton (0.0144 g/kg)	U
3-01-195-06	Nitrobenzene - Waste Acid Storage	Wash Acid Storage (Point G)	Uncontrolled	0.102 lb/ton (0.051 g/kg)	U
				0.96 lb/ton (0.048 g/kg)	U

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-01-195-80	Nitrobenzene - Fugitive Emissions	Process Pumps and Valves[g]	Uncontrolled	1.26 lb/ton (0.63 g/kg)	U
				0.76 lb/ton (0.38 g/kg)	U
			LD&R Plus Mechanical Seals	0.33 lb/ton (0.165 g/kg)	U
				0.198 lb/ton (0.099 g/kg)	U
3-01-301-01	Chlorobenzene Manufacturing - Tail-Gas Scrubber[h]	Tail-Gas Scrubber Treatment	Carbon Adsorption	0.0134 lb/ton (0.0067 kg/Mg)	U
			Uncontrolled	1.04 lb/ton (0.52 kg/Mg)	U
3-01-301-02	Chlorobenzene Manufacturing - Benzene Dry Distillation[h]	Atmospheric Distillation Vents[i]	Carbon Adsorption	0.0084 lb/ton (0.0042 kg/Mg)	U
			Uncontrolled	0.64 lb/ton (0.32 kg/Mg)	U
3-01-301-04	Chlorobenzene Manufacturing - Heavy Ends Processing[h]				
3-01-301-05	Chlorobenzene Manufacturing - Monochlorobenzene Distillation[h]				
3-01-301-03	Chlorobenzene Manufacturing - Benzene Recovery[h]	Atmospheric Distillation Vent - Benzene Recovery	Carbon Adsorption	0.00104 lb/ton (0.00052 kg/Mg)	U
			Uncontrolled	0.08 lb/ton (0.04 kg/Mg)	U
3-01-301-80	Chlorobenzene Manufacturing - Equipment Leaks[h]	Equipment Leaks	Detection and Repair of Major Leaks	See Section 4.5.2	
			Uncontrolled	See Section 4.5.2	
4-07-196-01	Chlorobenzene Manufacturing - Benzene Storage[h]	Benzene Storage Vessel	Internal Floating Roof	See Section 4.5.3	
			Uncontrolled	See Section 4.5.3	
3-01-211-02	Linear Alkylbenzene - Benzene Drying[j]	Benzene Azeotropic Column Vent (Point A)	Uncontrolled	7.4×10^{-3} lb/ton (3.7 g/Mg)	U
			Used as Fuel	1.5×10^{-6} lb/ton (7.4×10^{-4} g/Mg)	U

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-01-21103	Linear Alkylbenzene HFl Scrubber Vent[j]	Hydrogen Fluoride Scrubber Column Vent (Point B)	Uncontrolled	0.022 lb/ton (11 g/Mg)	U
			Used as Fuel	4.4×10^{-6} lb/ton (2.2×10^{-3} g/Mg)	U
			Flare	2.2×10^{-3} lb/ton (1.1 g/Mg)	U
3-01-211-02	Linear Alkylbenzene - Benzene Drying[k]	Benzene Azeotropic Column Vent (Point A)	Uncontrolled	7.4×10^{-3} lb/ton (3.7 g/Mg)	U
			Used as Fuel	1.5×10^{-6} lb/ton (7.4×10^{-4} g/Mg)	U
3-01-211-23	Linear Alkylbenzene - HCl Adsorber Vent[k]	Hydrochloric Acid Adsorber Vent (Point B)	Uncontrolled	0.5 lb/ton (250 g/Mg)	U
			Used as Fuel	1×10^{-4} lb/ton (0.05 g/Mg)	U
3-01-211-24	Linear Alkylbenzene - Atmospheric Wash/Decanter Vent[k]	Atmospheric Wash/Decanter Vent (Point C)	Uncontrolled	0.0246 lb/ton (12.3 g/Mg)	U
			Used as Fuel	5×10^{-6} lb/ton (2.5×10^{-3} g/Mg)	U
3-01-211-25	Linear Alkylbenzene - Benzene Strip Column[k]	Benzene Stripping Column Vent (Point D)	Uncontrolled	7.4×10^{-3} lb/ton (3.7 g/Mg)	U
			Used as Fuel	1.48×10^{-6} lb/ton (7.4×10^{-4} g/Mg)	U
3-01-060-01	Pharmaceuticals - General Process - Vacuum Dryers	Vacuum Dryer Vent	Venturi Scrubber	2.1 lb/1,000 gal (0.25 g/L)	B
3-10-001-01	Oil and Gas Production - Oil Wellheads	Equipment Leaks	Uncontrolled	1.27×10^{-7} lb/hr (5.77×10^{-8} kg/hr)	D
			Uncontrolled	3.9×10^{-8} lb/hr (1.77×10^{-8} kg/hr)	D
			Uncontrolled	6.25×10^{-9} lb/hr (2.84×10^{-9} kg/hr)	D

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-10-003-01	Glycol Dehydration Units - TEG Units	Reboiler Still Vent	Uncontrolled	0.93 tpy of BTEX/MMscfd (29.79×10^3 kg/yr of BTEX/MMscmd)	U
3-10-003-04	Glycol Dehydration Units - EG Units	Reboiler Still Vent	Uncontrolled	0.12 tpy of BTEX/MMscfd (3.84×10^3 kg/yr of BTEX/MMscmd)	U
3-06-005-08	Oil/Water Separators	Oil/Water Separator	Uncontrolled	1.3 lb of Benzene/10^6 gal of feed water (0.16 kg of Benzene/10^6 l of feed water)	E
3-06-005-20	Air Flotation Systems	Air Flotation Systems[1]	Uncontrolled	4 lb of Benzene/10^6 gal of feed water (0.48 kg of Benzene/10^6 l of feed water)	E
5-01-007-07	Solid Waste Disposal - Sewage Treatment	Comminutor	Wet scrubber	6.50×10^{-3} lb/million gal (7.79×10^{-4} kg/million liters)	E
5-01-007-15	Solid Waste Disposal - Sewage Treatment	Aerated Grit Chamber	Uncontrolled	3.56×10^{-3} lb/million gal (4.27×10^{-4} kg/million liters)	C
5-01-007-20	Solid Waste Disposal - Sewage Treatment	Primary Sedimentation Tank	Uncontrolled	5.50×10^{-4} lb/million gal (6.59×10^{-5} kg/million liters)	C
5-01-007-31	Solid Waste Disposal - Sewage Treatment	Diffused Air Activated Sludge	Uncontrolled	6.67×10^{-4} lb/million gal (7.99×10^{-5} kg/million liters)	B
5-01-007-33	Solid Waste Disposal - Sewage Treatment	Pure Oxygen Activated Sludge	Uncontrolled	3.80×10^{-6} lb/million gal (4.55×10^{-7} kg/million liters)	B
5-01-007-34	Solid Waste Disposal - Sewage Treatment	Trickling Filter	Uncontrolled	1.60×10^{-3} lb/million gal (1.92×10^{-4} kg/million liters)	C
5-01-007-40	Solid Waste Disposal - Sewage Treatment	Secondary Clarifier	Uncontrolled	1.40×10^{-4} lb/million gal (1.68×10^{-5} kg/million liters)	C

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
5-01-007-50	Solid Waste Disposal - Sewage Treatment	Tertiary Filter	Uncontrolled	4.00 x 10^{-6} lb/million gal (4.79 x 10^{-7} kg/million liters)	B
5-01-007-60	Solid Waste Disposal - Sewage Treatment	Chlorine Contact Tank	Uncontrolled	1.39 x 10^{-4} lb/million gal (1.67 x 10^{-5} kg/million liters)	E
5-01-007-61	Solid Waste Disposal - Sewage Treatment	Dechlorination	Uncontrolled	7.50 x 10^{-1} lb/million gal (7.50 x 10^{-1} kg/million liters)	B
5-01-007-71	Solid Waste Disposal - Sewage Treatment	Gravity Sludge Thickener	Uncontrolled	2.09 x 10^{-4} lb/million gal (2.50 x 10^{-5} kg/million liters)	B
5-01-007-72	Solid Waste Disposal - Sewage Treatment	Dissolved Air Floatation Thickener	Uncontrolled	3.00 x 10^{-3} lb/million gal (3.59 x 10^{-4} kg/million liters)	B
5-01-007-81	Solid Waste Disposal - Sewage Treatment	Anaerobic Digester	Uncontrolled	3.08 x 10^{-1} lb/million gal (3.69 x 10^{-2} kg/million liters)	B
5-01-007-91	Solid Waste Disposal - Sewage Treatment	Belt Filter Press	Uncontrolled	5.00 x 10^{-2} lb/million gal (5.99 x 10^{-3} kg/million liters)	B
5-01-007-92	Solid Waste Disposal - Sewage Treatment	Sludge Centrifuge	Uncontrolled	2.05 x 10^{-3} lb/million gal (2.46 x 10^{-4} kg/million liters)	B
5-01-007-93	Solid Waste Disposal - Sewage Treatment	Sludge Drying Bed	Uncontrolled	2.80 x 10^{-3} lb/million gal (3.36 x 10^{-4} kg/million liters)	B
5-02-006-01	Solid Waste Disposal - Landfill Dump	Waste Gas Flares	Uncontrolled	7.10 x 10^{-6} lb/MMBtu (3.05 x 10^{-9} g/kJ)	D
3-04-008-53	Synthetic Graphite	Mixing Cylinder (Vent A)	Uncontrolled	2.82 x 10^{-4} lb/lb (1.41 x 10^{-4} g/kg)	D
3-04-008-50	Synthetic Graphite	Cooling Cylinder (Vent B)	Uncontrolled	3.70 x 10^{-4} lb/lb (1.8 x 10^{-4} g/kg)	D
3-01-005-04	Carbon Black	Oil Furnace Process	Uncontrolled	6.23 x 10^{-4} lb/lb	U
3-01-025-01	Rayon-based Carbon Fibers	Carbon Fabric Dryer	Uncontrolled	7.17 x 10^{-7} lb/lb (7.17 x 10^{-4} g/kg)	B

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-04-001-99	Secondary Metals - Secondary Aluminum - Not Classified	General Facility (Vents A, D, E, F, and H)	Uncontrolled	7.08×10^{-2} lb/ton (3.54×10^{-2} kg/Mg)	D
		General Facility (Vents A, B, D, E, and G)	Uncontrolled	7.47×10^{-2} lb/ton (3.73×10^{-2} kg/Mg)	D
3-04-001-14	Secondary Metals - Secondary Aluminum - Pouring/Casting	Casting Shakeout Operation	Catalytic Incinerator	6.09×10^{-3} lb/ton (3.45×10^{-3} kg/Mg)	D
			Uncontrolled	5.48×10^{-3} lb/ton (2.74×10^{-2} kg/Mg)	D
3-05-001-01	Petroleum Industry - Asphalt Roofing -Asphalt Blowing - Saturant	Blowing Stills or Saturators	Uncontrolled	52 lb/ton (26 kg/Mg)	E
5-02-005-05	Solid Waste Disposal - Pathological Incinerator	Incinerator	Uncontrolled	4.92×10^{-3} lb/ton (2.46×10^{-3} kg/Mg)	D
5-01-005-15	Solid Waste Disposal - Sludge Incinerator	Multiple Hearth Furnace	Uncontrolled	1.2×10^{-2} lb/ton (5.8 g/Mg)	D
			Cyclone/Venturi Scrubbers	7.0×10^{-4} lb/ton (3.5×10^{-1} g/Mg)	E
			Venturi Scrubber	2.8×10^{-2} lb/ton (1.4 g/Mg)	E
			Venturi/Impingement Scrubbers	1.3×10^{-2} lb/ton (6.3 g/Mg)	D
			Venturi/Impingement Scrubbers and Afterburner	3.4×10^{-4} lb/ton (1.7×10^{-1} g/Mg)	E
5-01-005-16	Solid Waste Disposal - Fluidized Bed Incinerator	Fluidized Bed Incinerator	Venturi/Impingement Scrubbers	4.0×10^{-4} lb/ton (2.0×10^{-1} g/Mg)	E

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
5-01-005-15	Solid Waste Disposal - Multiple Hearth Incinerator	Multiple Hearth Incinerator	Uncontrolled	1.73 x 10^{-2} lb/ton (8.61 g/Mg)	D
			Venturi/Impingement Scrubbers	1.34 x 10^{-2} lb/ton (6.66 g/Mg)	D
			Elevated Operating Temperature	2.65 x 10^{-3} lb/ton (1.32 g/Mg)	D
			Elevated Operating Temperature/ Afterburner	1.41 x 10^{-3} lb/ton (7.02 x 10^{-1} g/Mg)	D
			Elevated Operating Temperature/ Afterburner/Venturi and Impingement Scrubbers	3.35 x 10^{-4} lb/ton (1.67 x 10^{-1} g/Mg)	D
5-03-005-01	Solid Waste Disposal - Hazardous Waste Incinerator	Liquid Injection Incinerator	Uncontrolled[m]	4.66 x 10^{-5} lb/ton (2.33 x 10^{-5} kg/Mg)	U
		Liquid Injection Incinerator	Various Control Devices[n]	1.23 x 10^{-3} lb/ton (6.16 x 10^{-4} kg/Mg)	U
1-01-002-03	External Combustion Boiler - Electric Generation	Cyclone Boiler - Coal	Baghouse/SCR/ Sulfuric Acid Condenser	5.58 x 10^{-6} lb/MMBtu (2.40 x 10^{-6} µg/J)	D
			Electrostatic Precipitator	7.90 x 10^{-6} lb/MMBtu (3.40 x 10^{-6} µg/J)	D
1-01-003-02	External Combustion Boiler - Electric Generation	Tangentially - Fired Boiler - Lignite	Electrostatic Precipitator/Scrubber	3.95 x 10^{-5} lb/MMBtu (1.70 x 10^{-5} µg/J)	D
1-01-006-01	External Combustion Boiler - Electric Generation	Opposed-wall Boiler - Natural Gas	Flue Gas Recirculation	1.40 x 10^{-6} lb/MMBtu (6.02 x 10^{-7} µg/J)	D

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
1-01-006-04	External Combustion Boiler - Electric Generation	Tangentially - Fired Boiler - Natural Gas	Flue Gas Recirculation	4.00×10^{-7} lb/MMBtu (1.72×10^{-7} µg/J)	D
1-01-009-01	External Combustion Boiler - Electric Generation	Boiler - Bark Fuel	Uncontrolled	3.60×10^{-3} lb/ton (1.80×10^{-3} kg/Mg)	E
1-02-004-01	External Combustion Boiler - Industrial	Boiler - No. 6 Fuel Oil	Uncontrolled	9.38×10^{-5} lb/MMBtu (4.04×10^{-5} µg/J)	D
1-02-007-99	External Combustion Boiler - Industrial	Boiler - Landfill Gas Fuel	Uncontrolled	3.78×10^{-4} lb/MMBtu (1.63×10^{-4} µg/J)	D
1-02-008-04	External Combustion Boiler - Industrial	Boiler - Coke and Coal Fuel	Baghouse	2.68×10^{-5} lb/MMBtu (1.15×10^{-5} µg/J)	D
1-02-009-01	External Combustion Boiler - Industrial	Boiler - Bark Fuel	ESP	6.90×10^{-4} lb/MMBtu (2.97×10^{-4} µg/J)	E
1-02-009-03	External Combustion Boiler - Industrial	Boiler - Wood Fuel	Wet Scrubber	4.20×10^{-3} lb/MMBtu (1.81×10^{-3} µg/J)	E
			Multiple Cyclone/ESP	5.12×10^{-4} lb/MMBtu (2.20×10^{-4} µg/J)	E
			Multiple Cyclone	1.04×10^{-3} lb/MMBtu (4.46×10^{-4} µg/J)	E
		FBC Boiler - Wood Fuel	Multiple Cyclone/ESP	2.70×10^{-5} lb/MMBtu (1.16×10^{-5} µg/J)	E
1-02-009-05	External Combustion Boiler - Industrial	Boiler - Wood and Bark	Multiple Cyclone/Wet Scrubber	1.01×10^{-3} lb/MMBtu (4.35×10^{-4} µg/J)	E
1-02-009-06	External Combustion Boiler - Industrial	Spreader-stoker Boiler - Wood Fuel	Multiple Cyclone	2.43×10^{-4} lb/MMBtu (1.05×10^{-4} µg/J)	D
			Mechanical Dust Collector	1.67×10^{-4} lb/MMBtu (7.18×10^{-5} µg/J)	D

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
1-02-012-01	External Combustion Boiler - Industrial	Boiler - Almond Shells and Wood	Baghouse	5.29×10^{-3} lb/MMBtu (2.28×10^{-3} µg/J)	D
1-03-007-01	External Combustion Boiler - Commercial/ Institutional	Boiler - POTW Digester Gas	Uncontrolled	3.50×10^{-3} lb/MMBtu (1.50×10^{-3} µg/J)	C
21-04-008-030	Stationary Source Combustion - Residential	Catalytic Woodstove	Uncontrolled	1.46 lb/ton (7.30×10^{-1} kg/Mg)	E
21-04-008-051	Stationary Source Combustion - Residential	Non-Catalytic Woodstove	Uncontrolled	1.94 lb/ton (9.70×10^{-1} kg/Mg)	E
2-02-001-02	Internal Combustion Engine - Industrial	Reciprocating Distillate Oil-fueled Engine	Uncontrolled	9.33×10^{-4} lb/MMBtu (4.01×10^{-1} ng/J)	E
2-02-001-04	Internal Combustion Engine - Industrial/Reciprocating Cogeneration	Cogeneration Distillate Oil-fueled Engine	Uncontrolled	5.36×10^{-4} lb/MMBtu (2.30×10^{-1} ng/J)	D
2-02-002-02	Internal Combustion Engine - Industrial/Reciprocating	2-cycle Lean Burn Natural Gas-fueled Engine	Uncontrolled	2.20×10^{-3} lb/MMBtu (9.46×10^{-1} ng/J)	E
		4-cycle Lean Burn Natural Gas-fueled Engine	NSCR	7.1×10^{-4} lb/MMBtu (3.05×10^{-1} ng/J)	E
2-02-004-01	Internal Combustion Engine - Industrial	Large Bore Diesel-fueled Engine	Uncontrolled	7.76×10^{-4} lb/MMBtu (3.34×10^{-1} ng/J)	E
2-02-004-02	Internal Combustion Engine - Industrial	Large Bore Oil- and Natural Gas-fueled Engine (Dual Fuel)	Uncontrolled	4.45×10^{-3} lb/MMBtu (1.91 ng/J)	E
2-03-007-02	Internal Combustion Engine - Commercial/Institutional	Reciprocating POTW Digester Gas-fueled Engine	Uncontrolled	6.90×10^{-4} lb/MMBtu (2.97×10^{-1} ng/J)	C
2-01-001-01	Internal Combustion Engine - Electric Generation	Gas Turbine Fueled with Distillate Oil	Afterburner	9.13×10^{-5} lb/MMBtu (3.92×10^{-2} ng/J)	D

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
2-01-002-01	Internal Combustion Engine - Electric Generation	Gas Turbine Fueled with Natural Oil	Catalytic Reduction	1.10×10^{-4} lb/MMBtu (4.73×10^{-2} ng/J)	E
3-04-004-03	Secondary Metals - Secondary Lead Production	Blast Furnace (Cupola)	Uncontrolled	4.08×10^{-1} lb/ton (2.04×10^{-1} kg/Mg)	D
			Afterburner	2.47×10^{-2} lb/ton (1.23×10^{-2} kg/Mg)	D
3-04-004-04	Secondary Metals - Secondary Lead Production	Rotary Sweating Furnace	Uncontrolled	1.66×10^{-1} lb/ton (8.30×10^{-2} kg/Mg)	D
3-04-003-98	Secondary Metals - Gray Iron Foundries	Sand Cooling and Belts	Baghouse	6.99×10^{-4} lb/ton (3.50×10^{-4} kg/Mg)	D
3-05-007-06	Cement Manufacturing - Wet Process - Kilns	Kiln--Burning Hazardous Waste Exclusively, or with Coal or Coke	ESP	3.7×10^{-3} lb/ton (1.8×10^{-3} kg/Mg)	B
		Kiln--Burning Hazardous Waste and Natural Gas as Fuel	ESP	7.5×10^{-3} lb/ton (3.7×10^{-3} kg/Mg)	D
		Kiln--Burning Hazardous Waste and Coal at High Combustion Temperature	ESP	3.9×10^{-6} lb/ton (1.9×10^{-6} kg/Mg)	D
3-05-006-06	Cement Manufacturing - Dry Process	Kiln--Burning Coal in Precalciner Process	FF	1.6×10^{-2} lb/ton (8×10^{-3} kg/Mg)	E
		Kiln--Burning Coal and 20 Percent TDF	FF	0.17 g/MMBtu	E

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
3-05-002-01	Petroleum Industry - Asphalt Concrete - Rotary Dryer	Rotary Dryer, LPG-fired	Uncontrolled	5.35 x 10^{-4} lb/ton (2.68 x 10^{-4} kg/Mg)	C
		Rotary Dryer, Oil-fired	Multiple Cyclone	7.7 x 10^{-5} lb/ton (3.85 x 10^{-5} kg/Mg)	C
		Rotary Dryer, Natural Gas- or Oil-fired	Baghouse with Single Cyclone, Knock-out Box, or Multiple Cyclone	2.08 x 10^{-4} lb/ton (1.04 x 10^{-4} kg/Mg)	B
		Rotary Dryer, Natural Gas- or Diesel-fired	Wet scrubber	1.95 x 10^{-5} lb/ton (9.75 x 10^{-6} kg/Mg)	C
3-05-002-08	Petroleum Industry - Asphalt Concrete - Asphalt heater - Distillate oil	Asphalt Heater, Diesel-fired	Uncontrolled	1.50 x 10^{-4} lb/ton (7.5 x 10^{-5} kg/Mg)	D
26-10-030-00	Waste Disposal - On-Site Incineration - Residential	Yard Waste Burning	Uncontrolled	1.10 lb/ton (5.51 x 10^{-1} kg/Mg)	U
28-01-500-000	Agricultural Production - Field Burning	Land Clearing/Burning	Uncontrolled	9.06 x 10^{-1} lb/ton (4.53 x 10^{-1} kg/Mg)	U
28-10-005-000	Other Combustion - Managed Slash Burning	Slash (Pile) Burning	Uncontrolled	9.06 x 10^{-1} lb/ton (4.53 x 10^{-1} kg/Mg)	U
28-10-001-000	Other Combustion - Forest Wildfires	Forest Fires - Fire Wood	Uncontrolled	6.6 x 10^{-1} lb/ton (3.3 x 10^{-1} kg/Mg)	U
		Forest Fires - Small Wood	Uncontrolled	6.6 x 10^{-1} lb/ton (3.3 x 10^{-1} kg/Mg)	U
		Forest Fires - Large Wood (Flaming)	Uncontrolled	6.6 x 10^{-1} lb/ton (3.3 x 10^{-1} kg/Mg)	U
		Forest Fires - Large Wood (Smoldering)	Uncontrolled	2.52 lb/ton (1.26 kg/Mg)	U

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
28-10-001-000	Other Combustion - Forest Wildfires (continued)	Forest Fires - Live Vegetation	Uncontrolled	1.48 lb/ton (7.4×10^{-1} kg/Mg)	U
		Forest Fires - Duff (Flaming)	Uncontrolled	2.52 lb/ton (1.26 kg/Mg)	U
28-10-015-000	Other Combustion - Managed Prescribed Burning	Prescribed Burning (Broadcast) - Fire Wood	Uncontrolled	6.6×10^{-1} lb/ton (3.3×10^{-1} kg/Mg)	U
		Prescribed Burning (Broadcast) - Small Wood	Uncontrolled	6.6×10^{-1} lb/ton (3.3×10^{-1} kg/Mg)	U
		Prescribed Burning (Broadcast) - Large Wood (Flaming)	Uncontrolled	6.6×10^{-1} lb/ton (3.3×10^{-1} kg/Mg)	U
		Prescribed Burning (Broadcast) - Large Wood (Smoldering)	Uncontrolled	2.52 lb/ton (1.26 kg/Mg)	U
		Prescribed Burning (Broadcast) - Live Vegetation	Uncontrolled	1.48 lb/ton (7.4×10^{-1} kg/Mg)	U
		Prescribed Burning (Broadcast) - Duff (Flaming)	Uncontrolled	6.6×10^{-1} lb/ton (3.3×10^{-1} kg/Mg)	U
		Prescribed Burning (Broadcast) - Duff (Smoldering)	Uncontrolled	2.52 lb/ton (1.26 kg/Mg)	U
5-03-002-03	Solid Waste Disposal, Open Burning - Autobody Components	Chunk Tires	Uncontrolled	3.05 lb/ton (1.53 kg/Mg)	C
		Shredded Tires	Uncontrolled	3.86 lb/ton (1.93 kg/Mg)	C

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
5-03-002-02	Solid Waste Disposal, Open Burning - Refuge	Unused Plastic Burning	Uncontrolled	9.55×10^{-5} lb/ton (4.77×10^{-5} kg/Mg)	C
			Forced Air	5.75×10^{-5} lb/ton (2.87×10^{-5} kg/Mg)	C
		Used Plastic Burning	Uncontrolled	2.47×10^{-5} lb/ton (1.23×10^{-5} kg/Mg)	C
			Forced Air	4.88×10^{-5} lb/ton (2.44×10^{-5} kg/Mg)	C
4-06-002-36	Transportation of Petroleum Products - Marine Vessels	Gasoline: Ship Loading - Uncleaned Tanks	Uncontrolled	0.023 lb/1000 gal (2.8 mg/liter)	D
4-06-002-37	Transportation of Petroleum Products - Marine Vessels	Gasoline: Ocean Barges Loading - Uncleaned Tanks	Uncontrolled	0.023 lb/1000 gal (2.8 mg/liter)	D
4-06-002-34	Transportation of Petroleum Products - Marine Vessels	Gasoline: Ship Loading - Ballasted Tank	Uncontrolled	0.015 lb/1000 gal (1.8 mg/liter)	D
4-06-002-035	Transportation of Petroleum Products - Marine Vessels	Gasoline: Ocean Barges Loading - Ballasted Tank	Uncontrolled	0.015 lb/1000 gal (1.8 mg/liter)	D
4-06-002-36	Transportation of Petroleum Products - Marine Vessels	Gasoline: Ship Loading - Cleaned Tanks	Uncontrolled	0.014 lb/1000 gal (1.6 mg/liter)	D
4-06-002-31	Transportation of Petroleum Products - Marine Vessels	Gasoline: Ocean Barges Loading - Cleaned Tanks	Uncontrolled	0.014 lb/1000 gal (1.6 mg/liter)	D
4-06-002-31	Transportation of Petroleum Products - Marine Vessels	Gasoline: Ship Loading - Cleaned and Vapor-Free Tanks	Uncontrolled	0.006 lb/1000 gal (0.77 mg/liter)	D
4-06-002-32	Transportation of Petroleum Products - Marine Vessels	Gasoline: Ocean Barges Loading - Cleaned and Vapor-Free Tanks	Uncontrolled	0.006 lb/1000 gal (0.77 mg/liter)	D

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
4-06-002-43	Transportation of Petroleum Products - Marine Vessels	Gasoline: Ship/Ocean Barges Loading- Any Condition-Nonvolatile Previous Cargo	Uncontrolled	0.006 lb/1000 gal (0.77 mg/liter)	D
4-06-002-43	Transportation of Petroleum Products - Marine Vessels	Gasoline: Ship Loading-Typical Condition - Any Cargo	Uncontrolled	0.016 lb/1000 gal (1.9 mg/liter)	D
4-06-002-40	Transportation of Petroleum Products - Marine Vessels	Gasoline: Ocean Barge Loading- Typical Condition - Any Cargo	Uncontrolled	0.016 lb/1000 gal (1.9 mg/liter)	D
4-06-002-38	Transportation of Petroleum Products - Marine Vessels	Gasoline: Barge Loading - Uncleaned Tanks	Uncontrolled	0.035 lb/1000 gal (4.2 mg/liter)	D
4-06-002-33	Transportation of Petroleum Products - Marine Vessels	Gasoline: Barge Loading - Cleaned and Vapor-Free Tanks	Uncontrolled	0.018 lb/1000 gal (2.2 mg/liter)	D
4-06-002-39	Transportation of Petroleum Products - Marine Vessels	Gasoline: Tanker Ship Loading - Ballasted Condition	Uncontrolled	0.007 lb/1000 gal (0.9 mg/liter)	D
4-06-002-42	Transportation of Petroleum Products - Marine Vessels	Gasoline: Transit Loss	Uncontrolled	0.024 lb/week-1000 gal (2.8 mg/week-liter)	D
4-04-002-01	Storage Tanks - Fixed Roof - Breathing Loss		Uncontrolled	0.5 lb/1000 gal. (5.4 mg/liter)	E
4-04-002-04	Storage Tanks - Fixed Roof - Working Loss				E
	Filling		Uncontrolled	0.086 lb/1000 gal (10.3 mg/liter)	E
	Emptying		Uncontrolled	0.034 lb/1000 gal (4.1 mg/liter)	E

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
4-04-002-50	Bulk Terminals/Plants - Loading Racks	Splash Loading-Normal Service	Uncontrolled	0.11 lb/1000 gal (12.9 mg/liter)	E
		Submerged Loading-Normal Service	Uncontrolled	0.044 lb/1000 gal (5.3 mg/liter)	E
		Balance Service Loading	Vapor Balancing	0.002 lb/1000 gal (0.4 mg/liter)	E
4-06-003-01	Petroleum Products Marketing - Underground Storage Tanks	Filling Losses - Splash Fill	Uncontrolled	0.104 lb/1000 gal (12.4 mg/liter)	E
4-06-003-02	Petroleum Products Marketing - Underground Storage Tanks	Filling Losses - Submerged Fill	Uncontrolled	0.066 lb/1000 gal (7.9 mg/liter)	E
4-06-003-06	Petroleum Products Marketing - Underground Storage Tanks	Filling Losses - Balanced Submerged Fill	Vapor Balancing	0.003 lb/1000 gal (0.40 mg/liter)	E
4-06-003-07	Petroleum Products Marketing - Underground Storage Tanks	Underground Tank Breathing Losses	Uncontrolled	0.009 lb/1000 gal (1.1 mg/liter)	E
4-06-004-01	Petroleum Products Marketing - Vehicle Refueling	Displacement Losses			
		Controlled	Stage II	0.0099 lb/1000 gal (1.2 mg/liter)	E
		Uncontrolled	Uncontrolled	0.099 lb/1000 gal (11.9 mg/liter)	E
4-06-004-02	Petroleum Products Marketing - Vehicle Refueling	Spillage	Uncontrolled	0.0063 lb/1000 gal (0.76 mg/liter)	E
3-06-010-01	Sludge dewatering units	Sludge dewatering unit[p]	Uncontrolled	660 lb of TOC/10^6 lb sludge (660 kg of TOC/10^6 kg sludge)	C
4-06-002-XX	Ocean Going Commercial	Motor Propulsion - All Underway Modes	Uncontrolled	0.25 lb/1000 gal fuel	E
		Auxilary Diesel Generators 500 KW (50% load)	Uncontrolled	0.87 lb/1000 gal fuel	E

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
4-06-002-XX	Commercial Marine Vessels-Harbor and Fishing	Diesel Engines			
		<500 hp			
		Full	Uncontrolled	0.22 lb/1000 gal fuel	E
		Cruise	Uncontrolled	0.54 lb/1000 gal fuel	E
		Slow	Uncontrolled	0.60 lb/1000 gal fuel	E
		500-1000 hp			
		Full	Uncontrolled	0.25 lb/1000 gal fuel	E
		Cruise	Uncontrolled	0.18 lb/1000 gal fuel	E
		Slow	Uncontrolled	0.18 lb/1000 gal fuel	E
		1000-1500 hp			
		Full	Uncontrolled	0.25 lb/1000 gal fuel	E
		Cruise	Uncontrolled	0.25 lb/1000 gal fuel	E
		Slow	Uncontrolled	0.25 lb/1000 gal fuel	E
		1500-2000 hp			
		Full	Uncontrolled	0.18 lb/1000 gal fuel	E
		Cruise	Uncontrolled	0.25 lb/1000 gal fuel	E
		Slow	Uncontrolled	0.25 lb/1000 gal fuel	E
		2000 + hp			
		Full	Uncontrolled	0.23 lb/1000 gal fuel	E
		Cruise	Uncontrolled	0.18 lb/1000 gal fuel	E
		Slow	Uncontrolled	0.24 lb/1000 gal fuel	E
		Gasoline Engines - all hp ratings			
		Exhaust (g/bhp-hr)	Uncontrolled	0.35 lb/1000 gal fuel	E
		Evaporative (g/hr)	Uncontrolled	0.64 lb/1000 gal fuel	E
A22-85-002-005	Line Haul Locomotive		Uncontrolled	0.00022 lb/gal	U
A22-85-002-010	Yard Locomotive		Uncontrolled	0.00054 lb/gal	U

(continued)

TABLE A-1. CONTINUED

SCC/AMS Code	Description	Emission Source	Control Device	Emission Factor	Factor Rating
28-10-040-000	Rocket Engines	Booster rocket engines using RP-1 (kerosene) and liquid oxygen as fuel	Uncontrolled	0.431 lb/ton (0.215 kg/Mg)	C

[a] Data are for a hypothetical plant using 50 percent naphtha/50 percent gas oil as feed and having an ethylene capacity of 1,199,743 lb/yr (544.2 Gg/yr).
[b] Intermittent emissions have been reported from the activation of pressure relief devices and the depressurization and purging of equipment for maintenance purposes.
[c] Emission factors are for a model plant with capacity 661 million lbs (300 million kg) per year. Actual emission factors may vary with throughput and control measures and should be determined through direct contacts with plant personnel. Factors are expressed as lb (kg) benzene emitted per ton (Mg) ethylbenzene/styrene produced. [1]
[d] Includes the following vents: benzene drying column, benzene recovery column, and ethylbenzene recovery column.
[e] Includes the following vents: polyethylbenzene recovery column at ethylbenzene plants; and benzene recycle column and styrene purification vents at styrene plants.
[f] Measured at post oxidizer condenser vent.
[g] Process pumps and valves are potential sources of fugitive emissions. Each model plant is estimated to have 42 pumps (including 17 spares), 500 process valves, and 20 pressure-relief valves based on data from an existing facility. All pumps have mechanical seals. Twenty-five percent of these pumps and valves are being used in benzene service. The fugitive emissions included in this table are based on the factors given in Section 4.5.2.
[h] These emission factors are based on a hypothetical plant producing 74,956 tons (68 Gg) monochlorobenzene, 13,669 tons (12.4 Gg) o-dichlorobenzene, and 17,196 tons (15.6 Gg) p-dichlorobenzene. The reader is urged to contact a specific plant as to process, products made, and control techniques used before applying these emission factors.
[i] Includes the following vents: benzene dry distillation, heavy ends processing, and monochlorobenzene distillation.
[j] Emission factor estimates based on a 198 million lb/yr (90,000 Mg/yr) hypothetical plant using the Olefin Process.
[k] Emission factor estimates based on a 198 million lb/yr (90,000 Mg/yr) hypothetical plant using the Chlorination Process.
[l] Includes dissolved air flotation (DAF) or induced air flotation (IAF) systems.
[m] The liquid injection incinerator has a built-in afterburner chamber.
[n] The incinerators tested had the following control devices: venturi, packed, and ionized scrubbers; carbon bed filters; and HEPA filters.
[o] Emission factor is based on the detection limit because no benzene was detected above the detector limit.
[p] Based on a 2.2 meter belt filter press dewatering oil/water separator bottoms, DAF float, and biological sludges at an average temperature of 125°F.[2]

"--" = Data not available.

(continued)

TABLE A-1. CONTINUED

REFERENCES

1. Key, J.A., and F.D. Hobbs. Ethylbenzene/Styrene: Report 5. In: *Organic Chemical Manufacturing*. Vol. 6: Selected Processes. EPA-450/3-3-80-028a. Research Triangle Park, North Carolina: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, 1980.
2. Research Triangle Institute. *Summary Report TSDF Dewatering Organic Air Emission Factors*. Research Triangle Park, North Carolina: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, May 1991.

(continued)